

United States of America

PRELIMINARY VIEW STATEMENTS CONCERNING WRC-2000

Summary

Attached are the United States preliminary view documents concerning the 2000 World Radiocommunication Conference (WRC-2000). These views reflect deliberations in the United States as of 20 March 1999 and will be kept up to date as the our preparatory process continues.

The United States intends to take into account comments and views expressed by other administrations as progress in proposal development continues.

The document as a whole and each of the individual views have been annotated to indicate the date of its last revision.

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United States Preliminary View for Agenda Item 1.2

WRC-2000 AGENDA ITEM 1.2: *to finalize remaining issues in the review of Appendix S3 to the Radio Regulations with respect to spurious emissions for space services, taking into account Recommendation 66 (Rev. WRC-97) and the decisions of WRC-97 adoption of new values, due to take effect at a future time, of spurious emissions for space services;*

ISSUE: Revision of Appendix S3, spurious emissions for space services, radar systems, and very narrowband or unmodulated signals.

BACKGROUND: Recommendation No. 66 (Rev. WRC-97) directs the ITU-R to submit a report to WRC-2000 with a view to finalizing the space services spurious emissions limits in Appendix S3 of the Radio Regulations. The current RR text lists space services spurious emissions as design objectives that will become limits if not changed by the next WRC. Current studies show that these limits are achievable.

TG1/5 recommended, however, that amateur earth stations below 30 MHz be required to meet the limits applying to other amateur terrestrial systems.

Furthermore, modifications to Appendix S3 made at WRC-97 could be wrongly interpreted in two provisions pertaining to radar systems. First, the limits on systems installed on or before 1 January 2003 were not intended to apply to radars; however, the wording in Section 1, paragraph 6 could be read as applying the limits to radars. Second, Section 2, paragraph 8 indicates that the e.i.r.p. measurement method can be used when it is not possible to measure the power applied to the antenna transmission line. Because there are many radar systems where the antenna attenuates the spurious signals, measurement of the power applied to the antenna transmission line may be “possible” but not “appropriate.” For this reason, common practice is to measure all radars using the e.i.r.p. method and should be indicated in the Appendix.

Lastly, difficulties may be experienced in applying Appendix S3 to very narrowband or unmodulated signals because of the current approach of approximating where spurious emissions start as approximately 250% of the necessary bandwidth.

U.S. PRELIMINARY VIEW: The United States supports removal of the “design objectives” designation from the space services spurious emissions limits given that the limits and reference bandwidth remain as agreed at WRC-97. Also, the United States supports covering amateur earth stations below 30 MHz under the limits applying to other amateur terrestrial systems.

Furthermore, it supports modification to Appendix S3 to make it clear that no limits apply to radar systems installed on or before 1 January 2003 and that the e.i.r.p. method can be used on radars.

The United States also supports using the amplifier bandwidth as the necessary bandwidth for determining where to begin measuring spurious emissions for very narrowband or unmodulated signals. **(12August98)**

United States Preliminary View for Agenda Item 1.3

WRC-2000 AGENDA ITEM 1.3: *to consider the results of ITU-R studies in respect of Appendix S7/28 on the method for the determination of the coordination area around an earth station in frequency bands shared among space services and terrestrial radiocommunication services, and to take the appropriate decision to revise this Appendix;*

ISSUE: The revision of Appendix **S7**

BACKGROUND: Appendix **S7** provides the method for determining the coordination area around an earth station. The appendix has not been updated in many years, though changes have been made to the associated recommendations (ITU-R Recommendations IS. 847-850). Work in TG1/6 is aimed at 1) updating the system characteristics that are used; 2) considering new approaches to handling new propagation information and other probabilistic factors; and 3) extending the frequency range to which the recommendations apply.

The TG1/6 review has identified some potential difficulties. In the past, propagation and probabilistic factors have been lumped together. TG1/6 is currently considering methods to separate these aspects. Though Appendix S7 has been successfully used for years without identifying the probabilistic component, the separation of the factors may lead to concern from services that do not like to consider their protection in terms of probability. However, without the probabilistic component new approaches for dealing with propagation may lead to an unnecessary increase in the size of coordination areas. Furthermore, there may not be a clear benefit to extending the frequency range below 1000 MHz. Also, if used to update Appendix **S7**, ITU-R Recommendation IS.847 in the context of transportable equipment may not be properly applied near land boundaries between administrations.

U.S. PRELIMINARY VIEW: The United States supports the updating of Appendix **S7** using the improved techniques given in ITU-R Recommendations IS. 847 through 850 as a basis, by using updated system characteristics, and by extending the frequency range upward. However, the United States is concerned about the work of TG1/6 as it pertains to new approaches for dealing with probabilistic and propagation components, extension of the frequency range below 1000 MHz, and the potential use of ITU-R Recommendation IS. 847 for transportable equipment. The United States recognizes that the existing methodology in Appendix **S7** has worked well and that unnecessary larger coordination areas may result from separating the propagation and probability considerations. This issue has not yet been resolved and the United States will continue to participate in the development of appropriate methods. **(3September98)**

United States Preliminary View for Agenda Item 1.4

WRC-2000 Agenda Item 1.4: *to consider issues concerning allocations and regulatory aspects related to Resolutions 126 (WRC-97), 726 (WRC-97), 128 (WRC-97), 129 (WRC-97), 133 (WRC-97) and 134 (WRC-97);*

ISSUE: Allocation of the Fixed Service in the Band 31.8-33.4 GHz and Identification of the Band for High Density Systems

BACKGROUND: WRC-97 added a fixed service allocation to the band 31.8-33.4 GHz and identified it via RR **S5.547**, as available for use by high-density systems. Since no studies had been performed within the ITU-R to verify the compatibility of such systems with the operations of other allocated services, WRC-97 choose to delay until 2001 implementation of the allocation via No. **S5.547A** and Resolution **126**. The band is currently used worldwide for airborne radionavigation systems critical to safety and operations related to ground mapping, weather avoidance and calibration of aircraft on-board navigation systems for accurate aerial delivery in adverse weather. Furthermore, at specific sites around the world the 31.8-32.3 GHz portion of the band is used for reception of space research signals from deep space that carries data essential to the function and experiments of deep space probes.

U.S. PRELIMINARY VIEW: Given the availability of higher and lower frequencies for high density fixed systems, the characteristics of the radionavigation equipment, and the fact that this is the only radionavigation allocation in this portion of the spectrum, WRC-2000 should require that technical studies demonstrate that such fixed systems can operate compatibly with existing airborne radionavigation systems before implementing a fixed service allocation. These studies must account for the mobile requirements of aeronautical radionavigation and large line-of-sight distances associated with these operations. Furthermore, the studies must determine methods to be used to ensure protection of space research sites (deep space). **(22May98)**

United States Preliminary View for Agenda Item 1.4

WRC-2000 Agenda Item 1.4: *to consider issues concerning allocations and regulatory aspects related to Resolutions 126 (WRC-97), 726 (WRC-97), 128 (WRC-97), 129 (WRC-97), 133 (WRC-97) and 134 (WRC-97);*

ISSUE: Use of the band 40.5-42.5 GHz by the FSS, including review of the allocation to the FSS in the band 40.5-42.5 GHz and the provisional application date of 1 January 2001 of this allocation in Regions 1 and 3, taking full account of the requirements of the other services to which the band is allocated and the available ITU-R studies.

BACKGROUND: At WRC-97, the United States proposed that an FSS primary allocation be added to the bands 40.5 to 42.5 GHz. The proposal was adopted by all Region 2 countries at the Conference. It was also adopted by most countries of Region 3 and all Arab countries and some African countries in Region 1.

In light of the use of the band 37-40 GHz by the Fixed Service (FS) around the world, the 40.5-42.5 GHz band was identified as a candidate band within the range 30-50 GHz for the FSS in the space-to-Earth direction to provide flexibility in implementing future FSS systems.

The United States is in the process of addressing co-channel and adjacent channel sharing issues. To this end the U.S. is participating in the studies that are being conducted in Working Party (WP) 4A and WP 4/9S in accordance with the provisions of Resolution **129 (WRC-97)**.

With regard to sharing issues with the radio astronomy service in the adjacent band, the United States is actively participating in Working Party 7D. This group's responsibilities regarding agenda item 1.4 is to conduct ITU-R studies pursuant to Resolution **128 (WRC-97)**. It is studying the potential for harmful interference from space stations in the FSS (space-to-Earth) operating in the band 41.5-42.5 GHz to the Radio Astronomy service operating in the 42.5-43.5 GHz band. WP 7D, with the help of SGs 1, 3 and 4 are to identify technical and operational measures that may be taken to protect RA station operations, including geographical separation and out-of-band emission limits to FSS space stations operating in the 41.5-42.5 GHz band, as well as measures that may be implemented to reduce the susceptibility of stations in the RA service to harmful interference. These studies have not yet been completed.

U.S. PRELIMINARY VIEW: The United States supports the worldwide allocation of the 40.5-42.5 GHz band for FSS in accordance with the following three principles:

1. The U.S. supports the allocation of the 40.5-42.5 GHz band worldwide to the FSS at WRC-2000 with an implementation in the year 2000 (see Resolution **134 (WRC-97)**), recognizing that fixed-satellite systems in the band 41.5-42.5 GHz shall not be implemented until technical and operational measures have been identified and agreed within ITU-R to protect radio astronomy service from harmful interference in the band 42.5-43.5 GHz.
2. The U.S. continues to participate in sharing studies relative to sharing in this band between the FSS and terrestrial services. These studies will take due account of Resolution **129** and **133** from WRC-97.

3. The allocation to the FSS on a worldwide basis should afford adequate protection to the Radio Astronomy service in the adjacent band (42.5-43.5 GHz) in accordance with Resolution **128 (WRC-97)**, noting that it would be appropriate for the Radio Astronomy service to investigate ways to reduce its susceptibility to harmful interference. **(8September98)**
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United States Preliminary View for Agenda Item 1.4

WRC-2000 AGENDA ITEM 1.4: *to consider issues concerning allocations and regulatory aspects related to Resolutions 126 (WRC-97), 726 (WRC-97), 128 (WRC-97), 129 (WRC-97), 133 (WRC-97) and 134 (WRC-97);*

ISSUE: Verification of PFD Limits in Article **S21** as to whether they adequately protect terrestrial services from FSS networks in the bands 37-40 GHz. (Resolution **133**)

BACKGROUND: Article **S21**, Table **S21-4** specifies that the PFD limits between 31.0 GHz and 40.5 GHz shall be:

-115 dB (W/m²) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

-115 + 0.5 (δ-5) dB (W/m²) in any 1 MHz band for angles of arrival (in degrees) between 5 and 25 degrees above the horizontal plane;

-105 dB (W/m²) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

The issue of adequacy of PFD limits is being addressed through the performance of necessary studies in WP 4-9-S.

U.S. PRELIMINARY VIEW: Based on the status of the WP 4-9-S studies and preliminary CPM information from technical studies in ITU-R WP 4-9-S (TEMP/53), the United States believes that the power flux density limits of -115/-105 dB(W/m²per MHz) currently specified in the band 37.5-40.5 GHz are adequate to protect the fixed service. Prior to concluding on the acceptability of the pfd limits, WP 4-9-S should consider additional sharing studies should consider, for example:

- Other FS point-to-point systems (including systems using high modulation schemes, e.g., 256 QAM), point-to-multipoint systems and FSS systems;
 - The suitability of pfd levels at high FS elevation angles;
 - The propagation information contained in draft new Recommendation [4-9-S/AD] (see Document 4-9-S/TEMP/45(Rev.1));
 - The effect of aggregate interference from multiple FSS systems.(20March99)
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United States Preliminary View for Agenda Item 1.5

WRC-2000 Agenda Item 1.5: *to consider regulatory provisions and possible additional frequency allocations for services using high altitude platform stations, taking into account the results of ITU-R studies conducted in response to Resolution 122 (WRC-97);*

ISSUE: Matters related to high-altitude radio-relay platforms.

BACKGROUND: At WRC-97, the bands 47.2-47.5 GHz and 47.9-48.2 GHz (which were already allocated for the Fixed Service) were designated for High-Altitude Radio-Relay Platform Stations (HAPS). While a designation does not limit the use of a band by types of services for which it is already allocated, it does give guidance to administrations wishing to implement specific service types. Domestically, the FCC has proposed to permit Fixed Service use, including HAPS, in the band 47.2-48.2 GHz, using five sets of two 100 MHz paired channels with each pair being separated by 500 MHz.

U.S. PRELIMINARY VIEW: The U.S. supports the WRC-97 designation of the bands 47.2-47.5 GHz and 47.9-48.2 GHz for use by HAPS. WRC-97 agreed to study how HAPS would share with other services that share these bands on a primary basis, with a view to determining if additional sharing is possible. **(20May98)**

United States Preliminary View for Agenda Item 1.6.1

WRC-99 AGENDA ITEM 1.6.1: *review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary;*

ISSUE: High Altitude Platforms (HAPS) in the terrestrial component of IMT-2000 (Matters related to IMT-2000)

BACKGROUND: Following WRC-97's designation of the bands 47.2 - 47.5 GHz and 47.9 - 48.2 GHz for use by HAPS in the fixed service, a number of administrations expressed interest in the ability of HAPS to provide terrestrial IMT-2000 mobile and fixed wireless access services. Because WRC-97 adopted RR **S4.15A** providing that "Transmissions to or from high altitude platform stations shall be limited to bands specifically identified in Article **S5**", it will be necessary to obtain a change to the Table of Frequency Allocations at WRC-99 to provide for the optional use of HAPS terrestrial IMT-2000 systems. Agenda Item 1.6.1 provides in pertinent part for "review of ... regulatory issues for advanced mobile applications in the context of IMT-2000 ... and adjustments to the Table of Frequency Allocations as necessary." The use of HAPS in the terrestrial component of IMT-2000 is a regulatory issue that will require an adjustment to the table within agenda item 1.6.1.

The United States submitted a contribution to the 27 April - 8 May meeting of TG 8/1 (Doc. 8-1/80) entitled working document toward a preliminary draft new recommendation on operational and technical characteristics for a terrestrial IMT-2000 system using high altitude platform stations that described characteristics of HAPS in the terrestrial component of IMT-2000 and that provided a PDNR proposing that HAPS be included as a station within the bands already identified for use by the terrestrial component of IMT-2000 (1885-1980 MHz, 2010-2025 MHz, and 2110-2170 MHz in Regions 1 and 3; and 1885-1980 MHz and 2110-2160 MHz in Region 2), subject to operating and sharing studies. The TG8/1 meeting determined that HAPS is a new technology that may provide benefits as a low cost, large area coverage, delivery vehicle for IMT-2000 terrestrial service. TG 8/1 established a Correspondence Group to study the operating and sharing characteristics of HAPS within the bands already identified for use by the terrestrial component of IMT-2000 in order to prepare contributions to the next meeting of TG 8/1 in November 1998.

U.S. PRELIMINARY VIEW: The United States supports the TG 8/1 studies concerning operating and sharing characteristics of HAPS IMT-2000 in the bands 1885-1980 MHz, 2010-2025 MHz, and 2110-2170 MHz in Regions 1 and 3; and 1885-1980 MHz and 2110-2160 MHz in Region 2. The United States will actively participate in the HAPS IMT-2000 Correspondence Group and encourages CITEL and other administrations to do so as well. Upon acceptance of HAPS TG8/1 study results, the United States may consider the recognition of HAPS as an option available to administrations in deploying terrestrial IMT-2000 systems. **(11September98)**

United States Preliminary View for Agenda Item 1.6.2

WRC-2000 Agenda Item 1.6.2: *identification of a global radio control channel to facilitate multimode terminal operation and worldwide roaming of IMT-2000;*

ISSUE: Is a specific physical global radio control channel required?

Background Information: At the time that the WRC-2000 agenda was established, studies were underway within TG8/1 examining whether global roaming could be accomplished by identifying one or more global radio control channels that could allow radios to be tuned to the appropriate frequency band identifying a "physical" channel has wanted, in favor of using other approaches that may include the development of a "logical" channel structure for this purpose.

U.S. PRELIMINARY VIEW: Based on discussions to date within TG8/1, it has been determined that facilitation of multi-mode terminal operation and worldwide roaming of IMT-2000 is possible without a specific physical global radio control channel. Thus, there is not a need to identify a global radio control channel for IMT-2000 in the Radio Regulations.

United States Preliminary View for Agenda Item 1.7

WRC-2000 AGENDA ITEM 1.7: *review of the use of the HF bands by the aeronautical mobile (R) and maritime mobile services with a view to protecting operational, distress and safety communications, taking into account Resolution 346 (WRC-97);*

ISSUE: Use of High Frequency (HF) Bands by Aeronautical Mobile (R) and Maritime Service.

BACKGROUND: The HF bands allocated for the distress and safety communications of the maritime and aeronautical mobile (R) services have been subjected to harmful interference caused by unauthorized use. This unauthorized use of safety related HF frequencies has increased in recent years and is resulting in considerable worldwide interference to the operational distress and safety communications spectrum utilized by the maritime and aeronautical communities. Radio is the sole means of communications for the aeronautical and maritime mobile services and the frequencies in the bands allocated to these services are reserved or used for distress and safety purposes and that the aeronautical mobile (R) service is a safety service. It is essential for the safety of life and property that distress and safety channels of the maritime mobile service and the allocations to the aeronautical mobile (R) service be kept free from unauthorized use and harmful interference.

The protection of maritime HF distress and safety frequencies, in particular the frequencies 12 290 kHz and 16 420 kHz, is addressed in Resolution 346 (WRC-97). The problem of interference to distress traffic on these frequencies is due to their use as calling frequencies. Resolution 346 calls for administrations to minimize the use of these frequencies for non-safety calling purposes by coast and ship stations.

The interference to HF frequencies allocated to the aeronautical mobile (R) service between 2 850 kHz and 22 000 kHz appears to be the result of unauthorized non-aviation use of aeronautical mobile (R) frequencies. In some parts of the world the aeronautical mobile (R) HF frequencies are being used for land mobile, broadcast, fixed point to point communications and unlicensed applications to support fishing fleets. These unauthorized applications have diminished the spectrum available for the aeronautical mobile (R) safety of life applications.

U.S. PRELIMINARY VIEW: The United States will work to ensure these safety services are protected. Administrations should ensure that stations of services other than the aeronautical mobile (R) and maritime mobile service abstain from using frequencies in the distress and safety channels and their guard bands and in the bands allocated exclusively to either the aeronautical mobile (R) or the maritime mobile service. That Administrations make every effort to identify and located the source of any unauthorized emission capable of endangering human life and property and the safe and regular conduct of aircraft operations, and to take necessary measures to prevent stations from operating in contravention of ITU Radio Regulations.

(20March99)

United States Preliminary View for Agenda Item 1.8

WRC-2000 Agenda Item 1.8: *to consider regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service networks in the bands 3 700 – 4 200 MHz and 5 925 - 6 425 MHz, including their coordination with other services allocated in these bands;*

ISSUE: Regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service networks in the bands 3700-4200 MHz and 5925-6425 MHz

BACKGROUND: This item concerns provision of broadband communications in the maritime context by earth stations on board vessels using frequencies and existing space segment in the fixed-satellite service. These facilities operate in three distinct modes: (i) at sea, (ii) while stationary in port, and (iii) in-motion along designated sea lanes while approaching or departing from port. The item is assigned to ITU-R Study Group 4-9S; Study Group 1 is listed as an interested group to provide guidance on associated regulatory issues. A Draft New Report (Doc. 4-9S/TEMP/39) contains the working plan for a Correspondence Group to complete all associated technical studies by the next international WP 4-9S meeting.

U.S. PRELIMINARY VIEW: The U.S. considers that operations at sea (beyond the as-yet-to-be-determined distance for near-shore coordination) by earth stations on board vessels in the fixed-satellite service do not present potential for interference to terrestrial stations and need not be coordinated. Operations while these facilities are stationary in port are being coordinated in the U.S. as fixed-satellite earth stations. However, from a regulatory point-of-view, it has not yet been determined whether port-side operations will be considered as “fixed earth stations” or as “temporary fixed earth stations”. Other technical and regulatory issues remaining for resolution concern the potential for interference between in-motion operations aboard ships that are underway between port and “at sea” (currently operated on a secondary basis) and terrestrial stations in the fixed service. This view is consistent with the work plan adopted for the Correspondence Group. **(3June98)**

United States Preliminary View for Agenda Item 1.9

WRC-2000 Agenda Item 1.9: *take into account the results of ITU-R studies in evaluating the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service in a portion of the 1 559 - 1 567 MHz frequency range, in response to Resolutions 213 and 220 (WRC-97);*

ISSUE: Mobile-Satellite Service (MSS) Uplink at 1675-1710 MHz.

BACKGROUND: At WARC-92, a Region 2 allocation for the Mobile-Satellite Service was made at 1670-1710 MHz for uplinks. At that time a corresponding downlink was allocated at 1492-1525 MHz. However, no MSS use of these allocations have been made. At WRC-97, proposals were submitted to use the 1559-1567 MHz band as a downlink to pair with a portion of the 1670-1710 MHz band for uplink. This proposal was not adopted by WRC-97.

The U.S. has an extensive network of Meteorological Aids (MetAids) operations operating between 1670 and 1683 MHz. MSS uplinks are not compatible with these operations. Under domestic law the 1670-1675 MHz portion is to be vacated by MetAids putting increased importance on maintaining the 1675-1683 MHz portion for MetAids. Sharing between MSS uplinks and Meteorological-Satellite (MetSat) receivers operating above 1683 MHz may be possible under some circumstances.

The U.S. is working in WP8D and SG7 and elsewhere to document MetAids and MetSat operations in this band.

U.S. PRELIMINARY VIEW: There is a need to continue to have spectrum available and to protect the operation of the Met Aids and MetSat services. Possibly there could be some use of the 1683-1710 MHz band by MSS under a sharing arrangement with MetAids and MetSats. **(3June98)**

United States Preliminary View for Agenda Item 1.9

WRC-2000 AGENDA ITEM 1.9: *to take into account the results of ITU-R studies in evaluating the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service (MSS) in a portion of the 1 559 1 567 MHz frequency range, in response to Resolutions 213 (WRC-97) and 220 (WRC-97)*

ISSUE: Mobile-Satellite Service (MSS) downlink at 1559-1567 MHz.

BACKGROUND: The band 1559-1610 MHz is allocated to Radionavigation Satellite Service (RNSS) and the Aeronautical Radionavigation Service (ARNS). An objective of the United States, as well as the International Civil Aviation Organization (ICAO), is the implementation of a global navigation satellite system (GNSS) that can support aeronautical safety in all phases of flight. The implementation of GNSS will require use of the 1559-1610 MHz band, which is the sole band currently identified to meet present and future requirements of GNSS and its augmentations. A principal component of GNSS operating in this band today is Global Position System (GPS), a navigation satellite constellation providing a worldwide free-of-charge utility that is being used increasingly for critical radionavigation, geolocation and timing functions. GPS will be an element of GNSS. There are many types of GPS receivers and applications, including aeronautical radionavigation for all phases of flight, maritime, and uses on land such as surveying, automobiles and scientific investigations. Systems that augment GPS in critical applications are developing. Some of these systems are planned to operate using frequencies in the lower end of the 1559-1610 MHz band. These systems would be blocked by a Mobile-Satellite Service (MSS) allocation. In addition, there are new RNSS systems being proposed that would operate in the 1559-1567 MHz band, such as the European Space Agency's, European Navigation Satellite System.

WRC-97 adopted **RES 220** in response to a proposal to add an allocation to the 1559-1567 MHz band for the Mobile-Satellite Service. ITU-R WP8D has been tasked with performing studies to determine if sharing between MSS and ARNS and RNSS is feasible. The ITU Radio Regulation **S4.10** states "Members recognize that the safety aspects of radionavigation and other safety services require special measures to ensure their freedom from harmful interference; it is necessary therefore to take this factor into account in the assignment and use of frequencies." The United States is working in WP8D and ICAO to document GPS requirements and the requirements for new systems in this band. Studies are largely completed to determine interference requirements of a broad range of GPS receivers covering safety and non-safety applications.

Further work is planned for the next WP8D meeting.

U.S. PRELIMINARY VIEW: Based on present and future requirements of the radionavigation satellite services and in particular civil aviation, there is a need to retain the 1559-1610 MHz band for exclusive use by ARNS and the RNSS. Accordingly, the United States opposes any proposed MSS allocation in the 1559-1610 MHz band, and recommends suppression of Res. 220. (19January99)

United States Preliminary View for Agenda Item 1.10

WRC-2000 Agenda Item 1.10: *to consider results of ITU-R studies carried out in accordance with Resolution 218 (WRC-97) and take appropriate action on this subject;*

ISSUE: Use of the bands 1525-1559 MHz and 1626.5-1660.5 MHz by the Mobile-Satellite Service while ensuring the availability and integrity of safety communications

BACKGROUND: The generic MSS allocation, which was adopted at WRC-97, is intended to alleviate the current spectrum congestion for existing and planned MSS systems. Protection was afforded to the Global Mobile Distress and Safety System (GMDSS) and the Aeronautical Mobile-Satellite (Route) Service by footnotes **S5.353A**, **S5362A** and **S5362B**, respectively. These footnotes do not mandate that MSS service providers provide AMS(R)S communications. Without this mandate, civil aviation can be blocked from having satellite safety communications available if the MSS service providers choose not to provide AMS(R)S communications in the portion of the bands allocated for this purpose. ITU-R studies currently focus on determining the amount of spectrum these safety-of-life GMDSS and AMS(R)S services require in the 1525-1559/1626.5-1660.5 MHz bands and to determine how to accomplish prioritization, real-time pre-emptive access and, if necessary, interoperability between different mobile-satellite systems for GMDSS and AMS(R)S, in order to achieve the most flexible and practical use of the generic MSS allocations.

U.S. PRELIMINARY VIEW: The footnotes containing the protection for the safety-of-life services from MSS interference must be reviewed, and, if necessary, revised to ensure the availability and integrity of safety communications. **(3June98)**

United States Preliminary View for Agenda Item 1.11

WRC-2000 Agenda Item 1.11: *to consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions No. 214 (Rev.WRC-97) and 219 (WRC-97);*

ISSUE: Allocation below 1 GHz to NGSO MSS downlinks at 405-406 MHz.

BACKGROUND: At WRC-97, the U.S., World Meteorological Organization (WMO), and other countries drafted Resolution 219 (WRC-97) calling for a study of the possible allocation of the 405-406 MHz band for MSS at WRC-99. The 401-406 MHz band is currently allocated to the Meteorological Aids Service. ITU-R studies are ongoing to determine the feasibility and cost of transitioning the Meteorological Aids Service out of the 405-406 MHz band.

U.S. PRELIMINARY VIEW: The U.S. is considering an allocation in the NVNG MSS in the 405-406 MHz band pending the results of ITU-R studies. A possible transition plan and a date by which MetAids could migrate from the 405-406 MHz and NVNG MSS operations could commence are yet to be established. In order to protect SARSAT (406-406.1 MHz) and Radio Astronomy (406.1-410 MHz) bands from NVNG MSS out-of-band emissions, a 30 to 50 kHz guard band near the upper band edge may be required. **(12August98)**

United States Preliminary View for Agenda Item 1.11

WRC-2000 Agenda Item 1.11: *to consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions No. 214 (Rev. WRC-97) and 219 (WRC-97);*

ISSUE: Additional allocations to NVNG (Non-Voice Non-Geostationary) MSS (Earth-to-space) in the 450-470 MHz band

BACKGROUND: Several allocations to NVNG MSS exist in the 450-470 MHz frequency band. The frequency bands 455-456 MHz and 459-460 MHz are allocated to NVNG MSS in the entire ITU-R Region 2 and in several administrations in each of Regions 1 and 3. Additionally, the frequency band 454-455 MHz is allocated to the MSS in countries in each of the three ITU-R Regions by Radio Regulations **S5.286D** and **S5.286E**. The limited allocations in these frequency bands reduce the ability of potential networks in these bands to provide the worldwide communications services of which they are inherently capable. Agenda item 1.11 includes "... to consider additional allocations on a worldwide basis for the non-GSO/MSS below 1 GHz"

Resolution **214 (Rev. WRC-97)** invited the ITU-R to study sharing between both existing and planned terrestrial services. The studies conducted within ITU-R Study Groups have indicated that with appropriate technical and operational constraints, Earth-to-space links for NVNG MSS networks can frequency share with certain terrestrial systems currently operating or planned for operation in the band.

In *considering b)*, Resolution **214 (Rev WRC-97)** indicated that in order to meet projected MSS requirements below 1 GHz, a range of an additional 7 to 10 MHz will be required in the near future. Additions to the existing NVNG MSS allocations could partially provide the required NVNG MSS spectrum.

U.S. PRELIMINARY VIEW: The United States supports expanding the existing NVNG MSS allocations at 454-455, 455-456, and 459-460 MHz to worldwide allocations. ITU-R studies have shown the compatibility of NVNG MSS (Earth-to-space) allocations with certain types of terrestrial MS systems that operate in the 450-470 MHz band, with certain technical and operational constraints on the NVNG MSS networks to facilitate co-frequency sharing with the existing services.

(20March99)

United States Preliminary View for Agenda Item 1.12

WRC-99 Agenda Item 1.12: *to consider progress of studies on sharing between feeder links of non-geostationary satellite networks in the mobile-satellite service and geostationary-satellite networks in the fixed-satellite service in the bands 19.3-19.7 GHz and 29.1-29.5 GHz, taking into account Resolution 121 (Rev. WRC-97).*

ISSUE: Sharing between NGSO MSS feederlinks and GSO FSS networks in the Bands 19.3 - 19.7 GHz and 29.1-29.5 GHz.

BACKGROUND: Resolution 121 requests that the ITU-R conduct a study of sharing possibilities between GSO FSS and NGSO MSS feederlinks in the bands 19.3-19.7 GHz and 29.1-29.5 GHz.

U.S. PRELIMINARY VIEW: Resolution 121 is no longer necessary because the issue of GSO/NSGO sharing in the feederlink bands is being addressed in the ITU-R. A deletion of the reference to Resolution 121 in S5.541 would follow. (12January99)

United States Preliminary View for Agenda Item 1.13

WRC-2000 Agenda Item 1.13: *on the basis of results of the studies in accordance with Resolutions 130(WRC-97), 131(WRC-97), and 538(WRC-97):*

1.13.1: *to review and, if appropriate, revise the power limits appearing in Articles S21 and S22 in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services;*

1.13.2: *to consider the inclusion in other frequency bands of similar limits in Articles S21 and S22, or other regulatory approaches to be applied in relation to sharing situations;*

ISSUE: Regulatory and technical provisions to enable sharing among non-GSO FSS, GSO FSS, GSO BSS, space sciences and terrestrial services.

BACKGROUND: WRC-97 adopted provisional power flux density limits in certain frequency bands which would apply to non-GSO FSS systems to protect GSO FSS networks, and GSO BSS networks. Resolution **130 (WRC-97)**, *Use of Non-Geostationary Systems in the Fixed-Satellite Service in Certain Frequency Bands* and Article **S22.2** of the Radio Regulations contain provisional limits corresponding to an interference level caused by one NGSO system in the frequency bands 10.7-12.75 GHz, 17.8-18.6 GHz, and 19.7-20.2 GHz. Resolution **538**, *Use of the Frequency Bands Covered by Appendices 30 and 30A by Non-GSO Systems in the Fixed-Satellite Service*, and Article **S22** contain provisional limits corresponding to permissible levels of interference from a NGSO system into a GSO BSS network. Resolution **131 (WRC-97)**, *Power Flux-Density Limits Applicable to Non-GSO FSS Systems for Protection of Terrestrial Services in the Bands 10.7-12.75 GHz and 17.7-19.3 GHz*, and Article **S21** contain limits to protect terrestrial services. Resolution **130** requests review of the provisional limits and calls for further study of current pfd limits.

U.S. PRELIMINARY VIEW:

1. The U.S. continues to review the power limits; both the provisional limits adopted in Article **S22** and those contained in WRC-97 Resolutions **130** and **538**, and the limits in Article **S21** and WRC-97 Resolution **131** with the intent of protecting the GSO FSS, GSO BSS, space sciences, and terrestrial services while allowing the introduction of NGSO FSS systems.

NGSO FSS/GSO FSS SHARING

Ku-Band

2. In the Ku-band (14/11 GHz), studies to date show that the “provisional limits” from WRC-97 need to be modified to accomplish the ITU WRC-97 and U.S. goal of protecting GSO systems while accommodating NGSO FSS systems. The U.S. believes that a balanced approach to meeting this goal

is possible and that existing and new satellite technological advances, such as NGSO FSS and evolving GSO FSS systems, can co-exist under the right regulatory framework. Technical studies by the ITU are incomplete on this matter. Therefore, the U.S. considers it premature to conclude on this issue until conclusions are reached at the ITU Working Party 4A (26 April to 4 May 1999) and Joint Task Group 4-9-11 (26 May to 1 June 1999) meetings.

Ka-Band

3. In the Ka-band (30/20 GHz), studies to date show that the “provisional limits” from WRC-97 need to be modified to accomplish the ITU WRC-97 and U.S. goal of ensuring the proper conditions for the co-existence of NGSO and GSO systems in order to ensure that they do not impose undue constraints on the development of NGSO and GSO FSS systems. The provisional epfd limits need to be modified so that appropriate protection is afforded to GSO Ka-band systems employing various techniques to compensate for rain fade. The JTG agreed that the introduction of an appropriate per-satellite PFD mask for NGSO systems would obviate the currently perceived need for more restrictive EPFD limits to protect Ka-band GSO FSS systems employing adaptive coding. The U.S. supports a per-satellite PFD mask approach so long as it does not pose undue constraints on NGSO FSS systems and results in EPFDs that are not overly restrictive and protect adaptive coding systems. Technical studies by the ITU are incomplete on this matter. Therefore, the U.S. considers it premature to conclude on this issue until conclusions are reached at the ITU Working Party 4A (26 April to 4 May 1999) and Joint Task Group 4-9-11 (26 May to 1 June 1999) meetings. Protection of Large GSO FSS earth stations

4. There will be a need for an alternative approach to facilitate sharing in some specific situations. Transmissions to earth stations with large antennas need to be protected from NGSO interference. The provisional epfd limits and associated time allowances do not adequately protect existing GSO FSS networks with large earth station antennas (large earth station antennas will be defined as a result of technical work within the ITU-R. EPFD limits and associated percentages of time that would provide sufficient protection to GSO networks having large earth station antennas would be substantially more stringent than limits that would protect other sensitive links. It is therefore desirable that GSO networks having large earth station antennas be treated separately from other sensitive links in order to avoid imposing undue constraints on the development of NGSO systems while protecting these GSO networks. The U.S. favors coordination between NGSO FSS networks and these GSO FSS networks. Regulatory procedures to allow an administration to identify the need for coordination and initiate the applicable coordination process are needed and may include additions or modifications to Articles **S5**, **S9**, **S22** and Appendices **S4** and **S5**. Thresholds based on GSO earth station antenna gain and protection criteria might be used in determining a need to coordinate.

NGSO FSS/GSO BSS SHARING

5. The provisional limits in the 12.2-12.7 GHz band need to be modified based on testing the link budgets, provided by administrations, with the JWP10-11S recommended criteria. The final epfd limits should take into account the JTG agreements regarding short-term criteria and rain models. Technical studies by the ITU on this matter are incomplete. Therefore, the U.S. considers it premature to conclude on this issue until conclusions are reached at the ITU Joint Working Party 10-11S (19 to 28 May 1999) and Joint Task Group 4-9-11 (26 May to 1 June 1999) meetings

6. In the 17.3-17.8 GHz band, sharing between transmitting non-GSO FSS user terminals and receive BSS user terminals is not feasible as both terminal types would be ubiquitously deployed. Further studies are required to more accurately quantify the constraints on the GSO BSS service of sharing with a few NGSO FSS gateways. Given additional difficulties sharing with radiolocation, the U.S. does not see the sharing of this band with non-GSO FSS as feasible in Region 2..

7. The study of the provisional power flux-density limits by the ITU-R and the review of these limits by WRC-2000 must ensure protection of modifications to the BSS Plans, including currently pending modifications and future modifications to the Plans. The majority of BSS systems that have been implemented, or will be implemented in the future, are modifications to the Plans. In addition, more than three years can lapse between the submission of Annex 2 information regarding proposed modifications to the Plans by an administration, and the actual publication of this information by the BR. This can result in substantial delays in completion of the modification process, even for modifications of existing frequency assignments. WRC-97 (in both Resolution **538** and Resolution **721**, agenda item 1.13) clearly foresaw the need to protect future modifications to the plans from NGSO FSS systems, and to ensure that these limits do not impose undue constraints on the development of these systems and services.

NGSO FSS/TERRESTRIAL SHARING

8. The U.S. supports the following:

- The per-satellite pfd limits agreed in the JTG are adequate for the protection of the FS in the 10.7-12.75 GHz band, subject to several assumptions including:
 - a) The number of co-coverage, co-frequency NGSO systems is in the range 3 to 5,
 - b) The contribution of GSO systems to long term interference is not significant,
 - c) The use of specific FS protection criteria, applied to typical FS links using ATPC features as described in Annex 2 to Attachment 1 of Doc. 4-9-11/367.

9. The U.S. supports the JTG output regarding the PFD limits in the 17.7-19.3 GHz band. The output is contained in Doc. 4-9-11/TEMP/80 which has been included in the JTG Chairman's Report (Doc. 4-9-11/367) as Annex 3 to Attachment 1.

10. The U.S. has maintained the position that the original pfd limits (-105/-115) contained in Article S21 of the ITU Radio Regulations are adequate to protect the FS while not unduly constraining the FSS, and that no technical studies have proven a need to tighten these limits. However, the limits proposed by Europe and agreed upon at the January 1999 meeting of JTG 4-9-11 reflect a compromise that the U.S. can accept based on the assumptions stated in Annex 3 to Attachment 1 of Doc. 4-9-11/367 (Doc. 4-9-11/TEMP/80). This solution adopted by the JTG is a compromise that should be supported in the spirit of international cooperation since it appears that the existing and proposed FSS systems can live with these pfd limits and they provide additional protection to FS systems.

11. The U.S. supports the output of the JTG regarding the sharing between FS Stations and non-GSO FSS Earth Stations in the 10-30 GHz range. The output is contained in Doc. 4-9-11/TEMP/62 Rev. 2 which has been included in the JTG Chairman's Report (Doc. 4-9-11/367) as Annex 4 to Attachment 1. The following reflects the preliminary view:

- The JTG recognized the difficulty of frequency sharing between FS and NGSO FSS in the same geographic area if either service deploys large numbers of stations.
- Although this is a national issue except in the vicinity of international borders, it is desirable to have global harmonization of frequency usage. In particular, many satellite systems require access to the same spectrum on a global basis. FS manufacturers and operators also benefit if their equipment can operate on the same frequencies in every country.
- In principle, the use of mitigation techniques by one or both services improves the ability of those services to share the same frequency bands. The feasibility of potential mitigation techniques and their relative effectiveness are currently being studied. This involves a wide range of technical, economic and regulatory tradeoffs. In cases where mitigation is insufficient or not practicable between FS and NGSO FSS in those bands that are heavily used by one service, possible solutions include placing constraints on one or both services to allow spectrum access..

12. Characteristics of radars currently operating in the bands 13.75-14.0 GHz have been examined. Radars operating in the 13.75-14.0 GHz band employ e.i.r.p. values of up to 79 dBW. Interference from these radiolocation stations to NGSO FSS networks would appear to be probable and sharing may not be feasible. Footnotes **S5.502**, **S5.503**, and **S5.503A** were adopted at WRC-92 and WRC-95 to facilitate sharing between radiolocation, radionavigation, space research, and fixed-satellite services in this band. Footnote **S5.502** states that the e.i.r.p. radiated by a station in the radiolocation or radionavigation services toward the geostationary orbit may not exceed 59 dBW and that earth stations in the fixed-satellite service must have an e.i.r.p. at least 68 dBW and a minimum antenna diameter of 4.5 meters, and the e.i.r.p. should not exceed 85 dBW. These restrictions are necessary for the protection of FSS carriers from radar interference and also minimize the possibility of unacceptable interference to the space research, radiolocation and radionavigation services. This delicate balance must be maintained in order to avoid unacceptable constraints on or interference to the services involved; therefore the U.S. opposes any change to footnotes **S5.502** and **S5.503**.

13. Characteristics of radars currently operating in the band 17.3-17.7 GHz have been examined. Space tracking radars operating in the band 17.3-17.7 GHz employ e.i.r.p. values up to 116 dBW directed at a satellite over extended periods of time. Sharing was found to be feasible with GSO FSS systems (Earth-to-space) if the radiolocation stations limit their emissions toward the geostationary orbit. Radiolocation station emissions toward a NGSO satellite could be 66 dB higher than toward the geostationary orbit. Sharing is not feasible between radiolocation stations and NGSO FSS networks. The U.S. opposes the introduction of NGSO FSS systems in this band in Region 2.

NGSO/SPACE SCIENCE SERVICES SHARING

14. Earth stations operating in the 13.75-14.0 GHz band are technically constrained by **S5.502** (minimum size of 4.5 meters; e.i.r.p. at least 68 dBW and should not exceed 85 dBW), **S5.503** (e.i.r.p. density in the band 13.772-13.778 MHz), and **S5.503A** (FSS shall not cause harmful interference to radiolocation stations installed on NGSO space stations in the space research and Earth exploration-satellite services until January 1, 2000). In addition, there are ITU-R Recommendations (e.g., ITU-R S.1068 (Fixed-satellite service and radiolocation/radionavigation services sharing in the band 13.75-14.0 GHz) and ITU-R SA.1071 (Use of the 13.75 to 14.0 GHz band by the space science services and the fixed-satellite service)) that describe sharing situations with the fixed-satellite service, including recommended limitations on the FSS. These footnotes and recommendations will have to continue to be applied to both GSO and NGSO systems operating in the band.

REGULATORY MECHANISMS FOR APPLYING POWER LIMITS TO MULTIPLE NGSO FSS SYSTEMS WHILE PROTECTING GSO FSS AND GSO BSS SYSTEMS

15. The U.S. supports the following principles:

- (i) the agreed upon aggregate interference levels needed to protect geostationary FSS and BSS systems from non-geostationary FSS systems under the Resolutions 130/538 approach should never be exceeded; and
- (ii) a mechanism for processing publication, coordination, and notification materials from non-geostationary FSS systems should be provided, even when there are more potential systems than the number on which the EPFD limits were based:
 - a. Each non-geostationary FSS system must meet the EPFD limits as verified by the Radiocommunication Bureau. Any non-geostationary FSS system that is found not to meet the applicable limits would receive an unfavorable finding from the Radiocommunication Bureau.
 - b. All co-frequency operational non-geostationary FSS systems together must not exceed the maximum aggregate interference levels needed to protect GSO FSS and BSS systems.

- c. RR **S9.53**, which states that “the requesting and responding administrations shall make every possible mutual effort to overcome the difficulties, in a manner acceptable to the parties concerned,” specifically applies to coordinations between non-geostationary FSS systems under RR **S9.12**.
- d. In coordinating non-geostationary FSS systems under RR **S9.12**, all affected administrations should be encouraged to use actual parameters/ measurements of systems to the greatest extent possible (e.g., to correct for approximation errors, such as using traffic statistics in lieu of PFD mask).

16. There is a need to develop a regulatory regime (most likely a WRC-2000 resolution) under which provision is made for the deployment of a number of non-geostationary FSS systems in a given band (N_{physical})¹ that exceeds the number on which the single-entry limits were based ($N_{\text{effective}}$)² while still ensuring that the aggregate interference limits necessary to protect the geostationary FSS and BSS are met. This resolution should require non-geostationary FSS systems to coordinate among themselves, yet still ensure that the aggregate EPFD mask into geostationary FSS and BSS systems is still met.

OTHER CONSIDERATIONS

17. GSO systems operating in slightly inclined orbits constitute an important subgroup of all operational satellites and need to be protected from NGSO interference.

18. Outside of those bands where provisional power limits were adopted by WRC-97, no technical basis has been established for consideration by WRC-2000 of the power limits approach to sharing between and or among NGSO FSS systems and GSO FSS, GSO BSS, space sciences, and or terrestrial services systems. Therefore, the U.S. opposes general application of power limits outside those bands where provisional power limits were adopted at WRC-97.

19. Sharing with satellite systems in “quasi-geostationary satellite orbit” needs to be considered within this agenda item.

¹ Based on actual system parameters.

² Based on a generic set of technical parameters.

United States Preliminary View for Agenda Item 1.13

WRC-2000 Agenda Item 1.13: *on the basis of results of the studies in accordance with Resolutions 130(WRC-97), 131(WRC-97), and 538(WRC-97);*

1.13.1: to review and, if appropriate, revise the power limits appearing in Articles S21 and S22 in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services;

ISSUE: Regulatory Mechanisms for Applying $\text{EPFD}_{\text{Down}}$, EPFD_{Up} , and EPFD_{ISS} * Limits to “N” NGSO Systems

BACKGROUND: The provisional power limits adopted in Resolution 130 (and included in Article S22) are intended to protect geostationary FSS systems from unacceptable interference caused by co-frequency, co-coverage non-geostationary FSS systems. Similar provisional power limits are put into place in Resolution 538 (and included in Article S22) to protect geostationary BSS systems. Once agreement is reached on the technical issue of adequate protection for geostationary FSS and BSS networks in the affected bands, it is necessary to develop regulatory text: (i) to establish and implement the relevant EPFD masks: (ii) to provide $\text{EPFD}_{\text{Down}}$, EPFD_{Up} , and EPFD_{ISS} limits on a single-system basis to be met by non-geostationary systems that seek to use the affected bands; and (iii) to address what would happen if the aggregate interference caused to geostationary FSS and BSS networks in a particular band exceeds the maximum permissible level of aggregate interference that was contemplated when the applicable $\text{EPFD}_{\text{Down}}$, EPFD_{Up} , and EPFD_{ISS} limits were developed.

In addressing the derivation of the number of non-geostationary systems to be considered in sharing studies within ITU-R Joint Task Group 4-9-11 (JTG), the JTG agreed at its January 1999 meeting that :

- An equivalent number “ $N_{\text{effective}}$ ” of systems should be considered for the purposes of studying the impact of aggregate interference from multiple non-GSO FSS systems, under the assumption that each system operates at the single entry EPFD limits.

* EPFD_{ISS} limits have been identified during the review of the Resolution 130/538 provisional limits now ongoing in the ITU-R as being necessary to address the interference case for bi-directional FSS allocations where non-geostationary FSS space stations would cause interference into receiving geostationary FSS and/or BSS space stations. The WRC-97 provisional limits covered this situation only for the frequency band 17.8-18.1 GHz, but omitted to do so for the frequency bands 10.7-11.7 GHz in Region 1, 12.5-12.75 GHz in Region 1, 12.7-12.75 GHz in Region 2, and 18.1-18.4 GHz.

- There is an agreement to use a range of 3 to 5 for “ $N_{\text{effective}}$ ” to assess interference from multiple non-GSO FSS systems into GSO FSS and GSO BSS.
- The actual number of systems “ N_{physical} ” that can operate co-frequency could be larger than the equivalent number “ $N_{\text{effective}}$ ” of systems.
- It is likely that different non-GSO systems operating co-frequency would use heterogeneous orbital parameters, i.e., that their constellation height and inclination would not be identical and that their communication parameters would be different, such that the interference profile that they produce would not be the same.
- There is a need to define, through regulatory provisions, what constitutes a non-GSO system.
- Further studies are required from WP 4A to obtain the proper value of equivalent systems “ $N_{\text{effective}}$ ” to be used in deriving the conversion between single entry and aggregate interference. Such studies should simultaneously consider the requirement for implementing mitigation techniques by non-GSO systems to protect the GSO (orbit avoidance) as well as mitigation techniques to protect each other, which has not been the case to date.
- There is a need for the development of a regulatory regime (WRC-2000 Resolution) that would allow for more than “ $N_{\text{effective}}$ ” systems to be deployed in a particular band (i.e., $N_{\text{physical}} > N_{\text{effective}}$), while still ensuring that the aggregate limits are met. This Resolution would take the form of a coordination procedure that would permit non-GSO systems to coordinate amongst themselves, while ensuring that the aggregate EPFD mask into GSO networks is still met.

U.S. PRELIMINARY VIEW:

1. The United States endorses the agreements reached by ITU-R Joint Task Group 4-9-11 with respect to the derivation of the number ($N_{\text{effective}}$) of non-GSO systems to be considered in ITU-R sharing studies.
2. The following principles represent the preliminary view of the United States on the regulatory approach to be developed pursuant to the final bullet of the foregoing agreements reached at the January 1999 JTG meeting. The objective is to ensure (i) that the agreed upon aggregate interference levels needed to protect GSO FSS and BSS systems from non-geostationary FSS systems under the Resolutions **130/538** approach are never exceeded; and (ii) to provide a mechanism for processing publication, coordination, and notification materials from non-GSO FSS systems, even when there are more potential systems than the number on which the $\text{EPFD}_{\text{Down}}$, EPFD_{Up} , and EPFD_{ISS} limits were based:
 - e. Each non-GSO FSS system must meet the $\text{EPFD}_{\text{Down}}$, EPFD_{Up} , and EPFD_{ISS} limits as verified by the Radiocommunication Bureau. Any non-geostationary FSS system that is found not to meet the applicable limits would receive an unfavorable finding from the Radiocommunication Bureau.

- f. All co-frequency operational non-GSO FSS systems together must not exceed the maximum aggregate interference levels needed to protect GSO FSS and BSS systems.
 - g. No. **S9.53**, which states that “the requesting and responding administrations shall make every possible mutual effort to overcome the difficulties, in a manner acceptable to the parties concerned,” specifically applies to coordination between non-geostationary FSS systems under No. **S9.12**.
 - h. In coordinating non-GSO FSS systems under No. **S9.12**, all affected administrations should be encouraged to use actual parameters/measurements of systems to the greatest extent possible (e.g., to correct for approximation errors, such as using traffic statistics in lieu of PFD mask).
 - i. There is a need to develop a regulatory regime (most likely a WRC-2000 resolution) under which provision is made for the deployment of a number of non-GSO FSS systems in a given band (N_{physical}) that exceeds the number on which the single-entry limits were based ($N_{\text{effective}}$) while still ensuring that the aggregate interference limits necessary to protect the GSO FSS and BSS are met. This resolution should require non-GSO FSS systems to coordinate among themselves, yet still ensure that the aggregate EPFD mask into GSO FSS and BSS systems is still met. **(20March99)**
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United States Preliminary View for Agenda Item 1.15.1

WRC-2000 Agenda Item 1.15.1: *to consider new allocations to the radionavigation-satellite service in the range from 1 to 6 GHz required to support developments;*

ISSUE: Identification of a new civil frequency for RNSS.

BACKGROUND: Additional Radionavigation-Satellite Service (RNSS) signals will greatly enhance the accuracy, reliability and robustness of civil Global Navigation Satellite Systems (GNSS), particularly the U.S. Global Positioning System (GPS) by enabling more effective corrections to be made for the time delay effects of the ionosphere on the signals from space. GPS currently provides signals that are used for radionavigation on two frequencies, one of which is available for civil applications. Additional civil signals, that are widely separated in frequency, will allow receivers to measure the time of arrival for two signals that have passed through the ionosphere and correct for the delay introduced by passage from space to earth. This will result in improved accuracy in the navigation solution. Improved location accuracy allows safety-critical users requiring dynamic, reliable capability to use GNSS; improves the overall accuracy of the system for the average user; and allows high-accuracy users (aeronautical, surveying, geodesy, weather forecasters, and others) to determine their data in a faster, more reliable manner. In addition, the protected civil signal will provide increased signal robustness that will help protect safety-critical users from the effects of radio frequency interference. The International Civil Aviation Organization (ICAO) has stated the requirement for an additional civil signal on GPS to support GNSS requirements and for space-based augmentation systems. Aeronautical users require that the protected signal operate within radio spectrum allocated to the Aeronautical Radionavigation Service (ARNS), which would also include the possibility of terrestrial augmentation systems.

The United States has identified a second new GPS civil signal at 1227.6 MHz and a third GPS signal at 1176.45 MHz to support GNSS developments. The third signal is proposed to be an international GNSS safety-of-life service for civil aviation with a required bandwidth on the order of 24 MHz. The U.S. will be working in the ITU-R and ICAO on the requirements and characteristics of this service. Technical studies tentatively show compatibility between existing operational ARNS systems and the proposed new GPS signal at 1176.45 MHz.

U.S. PRELIMINARY VIEW: The United States plans to seek a new RNSS frequency allocation on a worldwide basis within the 960 - 1215 MHz Aeronautical Radionavigation Service band. This allocation would be used in conjunction with the ARNS/RNSS allocation at 1559 - 1610 MHz to enable GNSS to meet the needs of aeronautical safety services as well as other applications.
(20March99)

United States Preliminary View for Agenda Item 1.15.2

WRC-2000 Agenda Item 1.15.2: *to consider the addition of the space-to-space direction to the radionavigation-satellite service allocations in the bands 1 215 - 1 260 MHz and 1 559 - 1 610 MHz;*

ISSUE: Recognition in the allocation table of space-based RNSS receivers in the bands 1559-1610 MHz and 1215-1260 MHz.

BACKGROUND: GPS receivers operating with both L1 and L2 signals are used for accurately positioning commercial and scientific spacecraft. However, the present allocation for RNSS does not afford protection for these signals. The U.S. is performing analysis to show that the GPS spaceborne receivers can operate in the current electromagnetic environment. Results of these studies show that interfering satellites would have to be located very close to the spaceborne GPS receiver for there to be a problem. Spurious emissions from MSS systems were also considered. However, the interference from an in-band MSS downlink such as has been proposed in the 1559-1567 MHz band has not been analyzed.

U.S. PRELIMINARY VIEW: It is appropriate to seek space-to-space as a directional indicator in the RNSS service in the 1559-1610 and 1215-1260 MHz bands. The U.S. will work in WP8D, SG7 and the Space Frequency Coordination Group to study compatibility with currently allocated services in these bands. The U.S. will also work in WP8D to demonstrate that use of GPS receivers on-board spacecraft will not impose additional constraints on services operating in adjacent bands. **(22May98)**

United States Preliminary View for Agenda Item 1.16

WRC-2000 Agenda Item 1.16: *to consider allocation of frequency bands above 71 GHz to the earth exploration-satellite (passive) and radio astronomy services, taking into account Resolution 723 (WRC-97);*

ISSUE: Passive Allocations above 71 GHz.

BACKGROUND: The passive services, (e.g. for remote sensing, radio astronomy, and meteorological observations) have substantial interests in the above 71 GHz frequency range as well, up to the 275 GHz limit of the allocation table and beyond. The active services are interested in using this spectrum, e.g. for applications involving high data rate transmission and because propagation characteristics allow extensive frequency reuse. Few active systems, particularly satellites have been implemented to date above 71 GHz.

NASA's Mission to Planet Earth is dedicated to understanding the total Earth system and the effects of natural and human-induced changes in the global environment. Passive remote sensing is key to the study of the Earth system. Other U.S. government agencies also utilize passive sensors to study and predict the weather and for other key scientific purposes. Various missions already employ passive sensing instruments at frequencies above 71 GHz and many more are planned.

During the next two decades the U.S intends to upgrade and continue operating several millimeter wave telescopes that currently work above 71 GHz. Congress also provided funds for construction of the MilliMeter Array (MMA), which is expected to become operational by approximately 2005. Several other millimeter wave telescopes may be built in this time frame, and their access to the spectrum must be ensured.

U.S. PRELIMINARY VIEW: WRC-2000 offers an opportunity to provide additional allocations to satisfy passive service needs, to protect existing allocations for future use, and to re-organize the allocations above 71 GHz as needed so that spectrum can be successfully shared between passive and active services in that range.

The interests of other services allocated in this portion of the spectrum must also be safeguarded and satisfied as well. The United States is considering options for band reallocations that are similar to what was done at 50.2-71 GHz at WRC-97. The band re-allocation will meet the needs of all the radio services involved. **(22May98)**

United States Preliminary View for Agenda Item 1.17

WRC-2000 Agenda Item 1.17: *to consider possible worldwide allocation for the earth exploration-satellite (passive) and space research (passive) services in the band 18.6 - 18.8 GHz, taking into account the results of the ITU-R studies;*

ISSUE: Earth exploration-satellite (passive) service allocation in the band 18.6 - 18.8 GHz.

BACKGROUND: Passive spaceborne sensors provide environmental data on soil moisture, water salinity, ocean temperature, rain, snow, ice, sea state, and oil spills. A set of frequency bands is essential for these measurements because simultaneous measurements at several frequencies are needed to isolate any single effect since the energy emitted at any one frequency is determined by several overlapping effects. The band between 18.6 and 18.8 GHz is one component in this set, without which these environmental data could not be obtained. At present, the allocation for the Earth exploration-satellite (passive) service is on a primary basis in Region 2, but on a secondary basis in Regions 1 and 3.

At WRC-97, a joint CITEL proposal was presented to upgrade the allocations to the Earth exploration-satellite (passive) service to primary. This proposal also included a pfd limit of -101 dBW/m² in a reference bandwidth of 200 MHz on the fixed-satellite service. A limit of -3 dBW on the power in the band that is delivered to an antenna of a fixed service station with a -10 dBi backlobe gain was also included in the proposal. At the conference, agreement could not be reached on the appropriate limits on the fixed and fixed-satellite services to enable passive sensors to perform their mission while permitting acceptable operation of fixed and fixed-satellite service systems.

Studies are currently being conducted to determine if the limits given in the proposal at WRC-97 can be modified to allow the fixed and fixed-satellite services to use more power. These studies will be completed and limits will be identified in the fall.

U.S. PRELIMINARY VIEW: The allocation for the Earth exploration-satellite (passive) service in Regions 1 and 3 must be elevated to world-wide primary status if the long-term ability to obtain environmental data with passive spaceborne sensors is to be preserved. Compatibility between the passive sensors and the active radio services requires adoption of constraints on the parameters of the fixed and fixed-satellite service systems that use the band. Studies are currently being conducted to further assess the sharing situation and determine suitable limits. The U.S. supports an upgrade to EES (passive) in Regions 1 and 3 to world-wide primary in the band 18.6 - 18.8 GHz with appropriate world-wide constraints on all allocated services to ensure a long term sharing situation that will allow satisfactory use of the band by allocated services. (22May98)

United States Preliminary View for Agenda Item 1.18

WRC-99 Agenda Item 1.18: *consider the use of new digital technology for the maritime mobile service in the band 156 - 174 MHz and consequential revision of Appendix S18, taking into account Resolution 342 (WRC-97);*

ISSUE: Appendix **S18**

BACKGROUND: Appendix **S18** of the ITU Radio Regulations defines the channels of the maritime mobile service. These channels support a variety of functions including “Distress, Safety and Calling: public correspondence, inter-ship, ship/shore/ship, port operations and ship movement. The maritime mobile frequency band, 156-174 MHz, (effectively 156-162 MHz in the U.S. due to previous domestic regulatory actions), supports maritime communications worldwide.

With the rapidly increasing use of the VHF maritime mobile band, particularly for data communications, increased congestion and mutual interference is being experienced which, among others, has resulted in unacceptable degradation of the distress and safety related function for which this band is utilized. Unless action is taken this situation will only worsen as usage continue to grow.

At WRC-97, the United States and CITEL proposed simplex use of duplex channels for Appendix S18. This was approved for a few specific public correspondence channels only, channels 18 and 82-86. Note M to Appendix **S18** must be modified to add more channels for simplex use. This will allow for more efficient use of Appendix **S18** channels and provide flexibility for administrations to meet their immediate requirements, while maintaining compatibility with the vast number of ships and pleasure craft now using the band in accordance with Appendix **S18**.

U.S. PRELIMINARY VIEW: Modify Specific Note M to Appendix **S18** to include additional channels for simplex use of duplex channels. **(20March99)**

United States Preliminary View for Agenda Item 1.19

WRC-2000 Agenda Item 1.19: *to consider the report of the Inter-Conference Representative Group (IRG) submitted by the Director of the Radiocommunication Bureau and determine the basis for replanning by the next conference so as to afford each country an amount of spectrum that permits the economic development of a broadcasting satellite system;*

ISSUE: How should the IRG guide GTE studies to provide increased spectrum for countries in the WRC-97 BSS and associated feeder link Plans for Regions 1 and 3 in accordance with the principles set forth in Resolution **532(WRC-97)**.

BACKGROUND: The IRG, whose report will provide the expert advice to be considered by WRC-2000, in determining the basis for revising the WRC-97 BSS Plan for Regions 1 and 3, was established by Resolution **532 (WRC-97)**. This Resolution calls for studies on the feasibility of increasing the capacity assigned to each country in the Regions 1 and 3 BSS and feeder link plans and sets forth eight principles to be observed in these studies.

U.S. PRELIMINARY VIEW: The U.S. supports the objective of increasing the capacity assigned to each Region 1 and 3 country sufficiently to permit the economic development of BSS systems. The U.S. believes that a capacity equivalent to 10 analogue channels per country, as described in Principle 1 of Annex 1 to Resolution **532 (WRC-97)**, is appropriate for such development.

In considering alternative approaches for achieving this replanning objective, the U.S. considers it essential to take into account, not only notified assignments as described in Principle 3 of Annex 1, but also proposed modifications to the Plan that have been published and which meet the due diligence requirements of Resolution **49(WRC-97)**. The basis for this view is that many of these modifications will, in fact, have been notified, brought into use, and the date of bringing into use confirmed to the Bureau well before the Conference at which the Regions 1 and 3 replanning will take place. Additionally, the U.S. is of the view that the objectives of long term flexibility and of leaving capacity for future requirements (principles 4 and 5 of Annex 1 to Resolution **532**) can best be achieved through the adoption of an all-digital approach, as contemplated in Principle 6 of Annex 1. We note that the number of television program channels that can be broadcast with an all-digital approach is at least five times the number of assigned analogue channels.

Finally, any possible replanning must protect Region 2 services in accordance with the current criteria of Appendices **S30** and **S30A**, and must not introduce additional constraints upon, those services, in accordance with Principles 7 and 8 of Annex 1 to Resolution **532 (WRC-97)**. (20March99)

United States Preliminary View for Agenda Item 1.19

WRC-2000 Agenda Item 1.19: *to consider the report of the Inter-Conference Representative Group (IRG) submitted by the Director of the Radiocommunication Bureau and determine the basis for replanning by the next conference so as to afford each country an amount of spectrum that permits the economic development of a broadcasting satellite system;*

ISSUE: Should the orbital position limitations contained in Annex 7 to Appendix S30 be observed during the IRG's replanning studies for the Regions 1 and 3 BSS and feeder link Plans?

BACKGROUND: Resolution 532 (WRC-97), which established the IRG, mandates guiding principles for the replanning studies of the IRG. These guiding principles (see Annex 1 to Resolution 532) include the following:

7. Ensure that the integrity of the Region 2 Plans and their associated provisions is preserved, by providing the same protection to the assignments contained in those plans as now received under the relevant provisions of the Radio Regulations, and by not requiring more protection from assignments in the Region 2 Plans than that currently provided under the Radio Regulations.
8. Ensure compatibility between the broadcasting-satellite service in Regions 1 and 3 and services having allocations in the planned bands in all three Regions.

Resolution 532 also requests that the IRG review Annex 7 (see Annex 2 to Resolution 532) to Appendix S30. Annex 7 to Appendix S30 contains, among other things, orbital position limitations and e.i.r.p. restrictions on Region 1 BSS to facilitate sharing with Region 2 FSS. The intent of these limitations is also to preserve future access by Region 2 FSS to the shared orbit/spectrum resource in the arc 37 W to 10 E.

Recently, the third meeting of the IRG provisionally decided to ignore the orbital position and e.i.r.p. limitations on Region 1 BSS in the arc from 37 W to 10 E during its replanning studies. The IRG did agree to continue to observe the 37 W limitation on Region 1 BSS.

U.S. PRELIMINARY VIEW: During the IRG's replanning studies, the orbital position limitations of Annex 7 shall be observed. In particular, no BSS assignments serving Region 1 should be located to the west of 37 W, and, within the Annex 7 restricted portion of the arc (37 W to 10 E), all assignments must use positions at, or at most, one degree to the east of existing positions in the WRC-97 Plan. However, in the case of positions within one degree to the east of an existing position, the Annex 7 requirement for an 8 dB reduction in e.i.r.p. compared to that appearing in the WARC-77 Plan is replaced by a 3 dB reduction. These constraints may be relaxed if, and only if, technical studies are performed that demonstrate that, under the relaxed constraints, compatibility with Region 2 services sharing the same frequencies is achieved, and that Region 2 FSS access to the concerned portion of the arc (37 W to 10 E) is not unduly constrained.

Similarly, at WRC-2000, Annex 7 should not be revised unless it is demonstrated by technical studies that Region 2 FSS access to the concerned portion of the arc (37 W to 10 E) is preserved, and that it will be possible to ensure compatibility between the FSS and BSS in Region 2, and the BSS in Region 1 in the frequency band 11.7 - 12.5 GHz. In the event that Annex 7 is changed as a result of technical studies, it will be necessary to revisit the relevant limits contained in Annexes 1 and 4 (for example, those for modifications to the Regions 1 and 3 Plans to protect Region 2 FSS) in order to ensure compatibility between the Region 2 FSS and Region 1 BSS. **(20March99)**

United States Preliminary View for Agenda Item 1.19bis

WRC-2000 Agenda Item 1.19bis: *in accordance with Article S14, to consider objections expressed by administrations with respect to the Radio Regulations Board Rules of Procedure relating to the application of S23.13 in order for the Bureau to modify its findings in accordance with the conclusions of the conference;*

ISSUE: Rules of Procedure associated with No. **S23.13**.

BACKGROUND: The Radio Regulation No. **S23.13** states:

"In devising the characteristics of a space station in the broadcasting-satellite service, all technical means available shall be used to reduce, to the maximum, the radiation over the territory of other countries unless an agreement has been previously reached with such countries."

No. **S23.13** was adopted at WARC-71. It was intended as a statement of good engineering practice to reduce BSS interference with the terrestrial services outside of the intended service area. At WRC-95, however, some countries sought to have the interpretation of No. **S23.13** revised to require, as a condition for registration, the approval of other countries within the service area of a BSS system proposed as a plan modification. After thorough debate, WRC-95 instructed the RRB to revise its Rules of Procedures to reflect the results of its debate. The decision reached by WRC-95 reflected a difficult compromise on the parts of all parties involved. The RRB made the revisions, but further concerns were raised at WRC-97. These concerns led WRC-97 to adopt Resolution **536** which resolves that:

"in addition to observing No. **S23.13**, and before providing satellite broadcasting services to other administrations, administrations originating the services should obtain the agreement of those other administrations."

The ITU Council at its 1998 meeting added item 1.19bis to the agenda for WRC-2000.

U.S. PRELIMINARY VIEW: Agenda item 1.19bis has the effect of re-opening an issue that was resolved after much discussion first at WRC-95, and then at WRC-97 by the adoption of Resolution **536**. There is no need to repeat the work and discussion of WRC-95 and WRC-97.

Further, the United States is concerned that re-opening this issue could compromise the principle of free flow of information contained in Article **19** of the Universal Declaration of Human Rights. This article provides that: "Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media regardless of frontiers." The Universal Declaration of Human Rights, including Article **19** just quoted, was passed by the UN General Assembly on 10 December 1948. **(20March99)**

United States Preliminary View for Agenda Item 1.20

WRC-2000 Agenda Item 1.20: *to consider the issues related to the application of Nos. S9.8, S9.9 and S9.17 and the corresponding parts of Appendix S5 with respect to Appendices S30 and S30A, with a view to possible deletion of Articles 6 and 7 of Appendices S30 and S30A, also taking into consideration Recommendation 35 (WRC-95);*

ISSUE: Procedural Issues associated with Appendices **S30** and **S30A**.

BACKGROUND: Agenda item 1.20 requires the consideration of possible merging of Articles **6** and **7** of Appendices **S30** and **S30A** of the ITU Radio Regulations (the procedures for coordinating and notifying unplanned services with respect to the Plans) with Article **S9**. This agenda item may also involve general consideration of the procedures in Appendices **S30** and **S30A**, or sharing criteria.

U.S. PRELIMINARY VIEW: Changes to the procedures, planned or unplanned procedures, could seriously impact U.S. networks, for example, through "unintended consequences" or intentional restriction of flexibility. There are changes to sharing criteria that the U.S. could support, for example Section 5 of Annex 1 to Appendix **S30**. There are sharing situations that are not currently addressed, that should be addressed, such as protection of the 17 GHz Region 2 BSS from modifications to the Regions 1 and 3 Plan. The U.S. could support changes to the procedures of Article **4** that would facilitate modification of the Plans. The U.S. will continue to participate in further work/regulatory/technical studies on these issues. (20May98)

United States Preliminary View for Agenda Item 1.21

WRC-2000 Agenda Item 1.21: *consider the report from the Radiocommunication Bureau on results of the analysis in accordance with Resolution 53 (WRC-97) and take appropriate actions;*

ISSUE: Report of the Director of the Radiocommunication Bureau on Compatibility of the revised (by WRC-97) Regions 1 and 3 Broadcasting-Satellite Service (BSS) Bands and Feederlink Plans.

BACKGROUND: Resolution **533 (WRC-97)** instructs the ITU's Radiocommunication Bureau (BR) to perform specific analyses regarding the compatibility of the new BSS Plans with other services sharing the same bands. Agenda item 1.21 instructs WRC-2000 to review the report of the BR.

U.S. PRELIMINARY VIEW: The U.S. will follow closely the BR's analysis. The U.S. wants to ensure that all services/networks are sufficiently protected from, and not unduly restricted by, the new Region 1 and 3 Plans that were adopted at WRC-97. **(20May98)**

United States Preliminary View for Agenda Item 2

WRC-2000 Agenda Item 2: *to examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations in accordance with Resolution 28 (WRC-95); and decide whether or not to update the corresponding references in the Radio Regulations, in accordance with principles contained in the Annex to Resolution 27 (Rev. WRC-97);*

ISSUE: Incorporation by Reference

BACKGROUND: A number of provisions of the Radio Regulations make reference to the ITU-R Recommendations. As the ITU-R Recommendations are updated, it is necessary to review the Radio Regulations to see if these references should be continued.

U.S. PRELIMINARY VIEW: The U.S. has examined every reference to an ITU-R Recommendation within the Radio Regulations. In each case, action is contemplated which will conclude the effort, under way since the Voluntary Group of Experts, to use incorporation by reference wherever the provision is mandatory and the specific recommendation version is cited. **(12August98)**

United States Preliminary View for Agenda Item 6

WRC-2000 AGENDA ITEM 6: *to identify those items requiring urgent actions by the radiocommunication study groups in preparation for the next World Radiocommunication Conference;*

ISSUE: Possible provision on the 2001 agenda for the allocation for feeder links in bands around 1.4 GHz to NVNG MSS with service links below 1 GHz.

WRC-01 AGENDA ITEM 3: *to consider the results of the studies related to the following with a view to considering them for inclusion in the agendas of future Conferences;*

WRC-01 AGENDA ITEM 3.5: *allocations on a worldwide basis for feeder links in bands around 1.4 GHz to the non-GSO MSS systems with service links operating below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolution 127 (WRC-97);*

BACKGROUND: The resolution to study the 1.4 GHz band for NGSO MSS with service links below 1 GHz was adopted at WRC-97. However, consideration of the results of studies related to that issue was placed on the WRC-01 agenda. A study in the ITU-R WP8D, that has not yet been considered by other appropriate working parties, indicates that the frequency band 1429-1432 MHz could be suitable for use by non-GSO MSS feeder downlinks and the frequency band 1390-1393 MHz could be suitable for use for non-GSO MSS feeder uplinks (See 8D/TEMP/58 Rev.1). This study was sent via liaison statement to Working Party 7C and 7D where it will be reviewed at the fall set of ITU-R meetings.

U.S. PRELIMINARY VIEW: Studies need to be completed and regulatory approach established to ensure that the radio astronomy, earth exploration-satellite (EES) and radiolocation services in the adjacent bands are not compromised. If studies are sufficiently advanced or completed prior to WRC-2000, the U.S. may be in a position to request modifications to agenda items 3 and 3.5 of the next WRC. These modifications could be to ask for consideration of the allocations at the next WRC. **(20March99)**
